with great ease with the formation of calcium alloys, and, in a few cases, of the free metal. As this is the case with chromium, it may be possible to devise a commercial method for its manufacture by the use of calcium carbid.

SOME years ago the sterilization of water by chlorid of lime (bleaching powder) was suggested by Traube, and the subject was further studied by Bassenge. In a recent number of the *Hygienische Rundschau*, A. Lode, of Innsbruck, describes further experiments along the same line. The process, as practically carried out, demands 0.15 gram of commercial, dry chlorid of lime per liter of water to be purified. This is rubbed with an equal weight of water in a porcelain dish, or on a large scale in a suitable wooden or stone vessel, to a thin paste, and added with constant agitation to the water. The corresponding amount of hydrochloric acid, for which the author gives a table, is then added. In the course of half an hour the water has cleared and 0.3 grams of sodium sulfite per liter is added. The cost of the process is found to be about 8 cents per cubic meter of water. It is claimed that by this process the water is completely sterilized, and even very bad waters rendered potable.

J. L. H.

THE NOVEMBER METEORS OF 1899.

PROFESSOR E. C. PICKERING has sent from the Harvard College Observatory the following account of the approaching meteoric shower:

The predicted time of maximum of the November meteors is November 15, 1899, at 18 h. Greenwich mean time. As a similar shower may not occur again for thirty years, no pains should be spared to secure the best possible observations. The most useful observations that can be made by amateurs are those which will serve to determine the number of meteors visible per hour throughout the entire duration of the shower. They should be made on November 15th, and also on the two preceding and following evenings. The most important time for observation is from midnight until dawn, as comparatively few meteors are expected earlier. Observations are particularly needed at hours when they cannot be made at the observatories of Europe and America. In general, the time required for ten or more meteors to appear in the region covered by the accompanying map, should be recorded. This observation should be repeated every hour or half hour. If the meteors are too numerous to count all those appearing upon the map, the observer should confine his attention exclusively to some small region, such as that included between the stars μ Ursae Majoris, 40 Lyncis, δ and a Leonis. If the meteors occur but seldom, one every five minutes, for instance, the time and class of each meteor should be recorded. Also note the time during which the sky was watched and no meteors seen, and the time during which that portion of the sky was obscured by clouds. Passing clouds or haze, during the time of observation should also be recorded. The date should be the astronomical day, beginning at noon, that is, the date of early morning observations should be that of the preceding evening. Specify what time is used, as Greenwich, standard, or local time. When a meteor bursts, make a second observation of its light and color, and when it leaves a trail, record the motion of the latter by charting the neighboring stars, and sketching its position among them at short intervals until it disappears, noting the time of each observation. If the path of a meteor is surely curved, record it carefully upon the map.

On November 14, 1898, thirty-four photographs were obtained of eleven different meteors. Their discussion has led to results of unexpected value. The greatest number of meteors photographed by one instrument was five. Only two meteors were photographed which passed outside of the region covered by the map, although the total region covered was three or four times as great. No meteors fainter than the second magnitude were photographed.

Photographs may be taken, first, by leaving the camera at rest, when the image of the stars will trail over the plate and appear as lines, or secondly, attaching the camera to an equatorial telescope moved by clockwork, when a chart of the sky will be formed, in which the stars will appear as points. A rapid-rectilinear lens is to be preferred in the first case, a wide-angle lens in the second. The full aperture should be used and as large a plate as can be covered.

The most rapid plates are best for this work; they should be changed once an hour, and the exact times of starting and stopping recorded. Care should be taken to stiffen the camera by braces, so that the focus will not be changed when the instrument is pointed to different portions of the sky, especially if the lens is heavy. If the first method is employed, the position of the camera should be changed after each plate, so as to include as much as possible of the region of the map on each photograph. If pointed a little southeast of ϵ Leonis, the radiant will reach the center of the field about the middle of the exposure. A watch of the region should also be kept, and the exact time of appearance and path of each meteor as bright as the Pole Star should be recorded. The plates should be numbered on the film side with a pencil, and should be sent to the Harvard Observatory with accompanying notes and other observations. After measurement there, they will be returned if desired. The value of the results will be much increased if similar photographs can be obtained by a second camera from ten to forty miles distant, and preferably north or south of the other.

OBSERVATION OF THE TOTAL SOLAR ECLIPSE IN 1900.

President Harper, of the University of Chicago, at the 30th Convocation of the University on October 2d, spoke as follows of plans for observing the approaching solar eclipse:

A total eclipse of the sun is regarded as an event of great importance by astronomers, because of the opportunity it affords for studying the solar corona and other phenomena which are invisible at other times. The last total eclipse visible in the United States occurred on July 1, 1889, and a great number of astronomers from the various observatories visited California for the purpose of making observations. The next total eclipse will occur on May 28, 1900, the path of the shadow extending through the States of Virginia, North Carolina, South Carolina, Georgia, Alabama, Mississippi and Louisiana. Extensive preparations for observing it are being made by many institutions. General arrangements have been entrusted to an Eclipse Committee, of which the Director of the Yerkes Observatory is Secretary, appointed last year, at the Harvard Conference of Astronomers and Astrophysicists.

(1) Photographic observations of the spectrum of the sun's edge, similar to those made at the recent eclipses in India and Nova Zembla, but with more powerful apparatus.

(2) Photographs of the corona on a large scale, for the purpose of showing the detailed structure.

(3) Measurement of the heat radiation of the corona.

This last investigation has not been carried out successfully at any previous eclipse. Special instruments have been devised for the purpose, which promise to give interesting results. Professor Nichols, of Dartmouth College, who, in the summer of 1898, succeeded for the first time in detecting heat radiation from the stars, at the Yerkes Observatory, has offered to assist in making these measurements and expects to furnish part of the apparatus.

The Yerkes Observatory did not have the means to send an expedition to the last eclipse, which occurred in India in January, 1898. As the present occasion is so favorable, and as the expense involved is comparatively small, it is hoped that the friends of the observatory will make it possible to send out a party. The expenses will include a large heliostat, with accessory apparatus for determining the radiation of the corona and for photographing the corona on a large scale; transportation expenses for four astronomers, freight and express charges, teaming, lumber, brick, cement, labor, etc. (for the construction of temporary shelters for the instruments and piers). Other apparatus, including spectroscopes, telescopes, and all mirrors for the heliostat, etc., will be supplied from the Yerkes Observatory. The heliostat and other instruments to be purchased will become an important part of the permanent equipment of the observatory, to be used in its daily work on the sun.

On account of the exceptionally favorable atmospheric conditions which prevail at Lake Geneva during the day, special attention is given at the Yerkes Observatory to the study of the sun. A number of important advances in our